



PPT EQUIPMENT LIST

Calcination and Sintering Equipment:

New Emission Control System Ready for Operation

Responding to demand from various industries for processing materials that emit nitrogen oxide (NOx), [Powder Processing and Technology](#) (PPT) has added advanced emission control capability to support its growing client base. The [Tri-Mer](#) emissions control unit, based on catalytic ceramic filters, is the state-of-the-art technology for processes that emit NOx. The unit has been fully commissioned and has demonstrated the ability to handle NOx emissions in the range of two to fifty pounds per hour with NOx destruction efficiency adjustable up to 95%. The Tri-Mer unit also captures particulate – PM10, PM2.5, and submicron PM – to over 99% efficiency. The system can be modified to handle SOx, HCl and VOC's and PPT will add those capabilities as clients requirements dictate. Thermal processing equipment with emission control noted with “**ECS**”.

Indirect Fired Calciners #2 and #6 (Gas Fired)

- Temperature capability of 1100°C (2025°F)
- Inconel 601 Tube; 1 m (39”) Ø x 10 m (33’) (L) with 7 m (23’) heating zone
- Tube RPM of 0.75 ~ 6
- 3 individually controlled temperature zones
- Powder and pellet feed capability
- ~ 550 Kg/hr (~ 1,200 lbs/hr) throughput
- Can be retrofitted to run nitrogen atmosphere
- 2 units are available
- Manufactured by Riedhammer
- #6 is **ECS** capable

Direct Fired Calciner #5 (Gas Fired)

- Temperature capability of 1425°C (2600°F)
- Refractory brick lined tube; 1.12 m (44”) Ø x 12 m (40’) (L)
- Tube RPM of 0.50 ~ 6.0
- Slurry or pellet feed capability
- ~ 680 Kg/hr (~ 1,500 lbs/hr) throughput
- Manufactured by Bartlett-Snow

Indirect Fired Calciner #7 (Electric Fired)

- Temperature capability of 1110°C (2025°F)
- Inconel 601 Tube; 36 cm (14”) Ø x 8 m (26’) (L) with 4.5 m (15’) heating zone
- Tube RPM of 0.75 ~ 6
- 4 individually controlled temperature zones
- Powder or pellet feed capability
- ~ 70 Kg/hr (~ 150 lbs/hr) throughput
- Manufactured by Riedhammer
- Nitrogen Atmospheric Control Capability
- **ECS** capability (soon)

Calcination and Sintering Equipment (Continued):

Indirect Fired Calciner #8 (Gas Fired)

- Temperature capability of 1100°C (2010°F)
- HT Alloy Tube; 0.6 m (24") Ø x 7.3 m (24') (L) with 5.5 m (18') heating zone
- Tube RPM of 0.75 ~ 6
- 3 individually controlled temperature zones
- Powder feed capability
- ~ 250 Kg/hr (~ 550 lbs/hr) throughput

Indirect Fired Calciners #9 and #10 (Electric Fired)

- Temperature capability of 1100°C (2010°F)
- HT Alloy Tube; 0.6 m (24") Ø x 10 m (33') (L) with 7.3 m (24') heating zone
- Tube RPM of 0.75 ~ 6
- 3 individually controlled temperature zones
- Powder feed capability
- ~ 250 Kg/hr (~ 550 lbs/hr) throughput
- 2 units are available
- Nitrogen Atmospheric Control Capability (#10)

Calcining / Sintering Tunnel Kilns (Electric)

- Temperature capability of 1480°C (2700°F)
- Powder, pellet and pressed compact materials
- Material loaded into refractory saggars on kiln cars
- Load capacity: 3.5 liter (9" x 8.5" x 2.75")/sagger x 40 or 48 saggars/car (37 cars in kiln)
- Push intervals of 45 minute to 3 hours
- 2 units have nitrogen atmosphere capability
- Manufactured by Harper

Calcining / Sintering Tunnel Kiln (Electric)

- Temperature capability of 1480°C (2700°F)
- Powder, pellet and pressed compact materials
- Material loaded into refractory saggars on kiln cars
- Load capacity: 3.5 liter (9" x 8.5" x 2.75")/sagger x 40 or 48 saggars/car (34 cars in kiln)
- Push intervals of 45 minute to 3 hours
- Manufactured by Harper

Calcining / Sintering Shuttle Kiln (Electric)

- Temperature capability of 1340°C (2445°F)
- Powder, pellet and pressed compact materials
- Material loaded into refractory saggars or on refractory shelves
- Load capacity: 3.5 liter (9" x 8.5" x 2.75")/sagger, ~ 784 saggars/load
- Working dimensions: 5 m³ (38" (W) x 144" (L) x 56" (H)) with 2 cars
- Nitrogen atmosphere capability
- Manufactured by Nabertherm

Emission Control System; NO_x Removal (NEW)

Spray Drying Equipment:

20' Niro Spray Dryer

- Slurry feed to nozzles or wheel atomizer
- 1 ~ 5 nozzles capability of maximum 1,000 psi pump pressure
 - ~ 680 Kg/hr (~ 1,500 lbs/hr) throughput
 - Median granule size of 80 ~ 140 microns
- Wheel atomization capability of maximum 12,500 wheel RPM
 - ~ 1,350 Kg/hr (~ 3,000 lbs/hr) throughput
 - Median granule size of 60 ~ 120 microns

18' Niro Spray Dryer

- Slurry feed to nozzles or wheel atomizer
- 1 ~ 5 nozzles capability of maximum 1,000 psi pump pressure
 - ~ 630 Kg/hr (~ 1,400 lbs/hr) throughput
 - Median granule size of 80 ~ 150 microns
- Wheel atomization capability of maximum 12,500 wheel RPM
 - ~ 900 Kg/hr (~ 2,000 lbs/hr) throughput
 - Median granule size of 60 ~ 120 microns

16' Niro Spray Dryer

- Slurry feed to wheel atomizer
- Wheel atomization capability of maximum 14,000 wheel RPM
 - ~ 900 Kg/hr (~ 2,000 lbs/hr) throughput
 - Median granule size of 60 ~ 120 microns.

9' 6" Anhydro Spray Dryer

- Slurry feed to nozzle
- 1 nozzle capability of maximum 700 psi pump pressure
 - ~ 230 Kg/hr (~ 500 lbs/hr) throughput
 - Median granule size of 80 ~ 150 microns.

13' 6" Anhydro Spray Dryer

- Wheel atomization capability of maximum 18,000 wheel RPM
 - ~ 200 Kg/hr (~ 440 lbs/hr) throughput
 - Median granule size of 30 ~ 80 microns

11' Anhydro Spray Dryer

- Wheel atomization capability of maximum 20,000 wheel RPM
 - ~ 150 Kg/hr (~ 330 lbs/hr) throughput
 - Median granule size of 30 ~ 80 microns

Grinding Equipment:

Ceramic Ball Mills

- High Alumina spherical grinding media
- Six 5' x 6' Ceramic Mills

Steel Ball Mills

- Hardened C-Steel spherical grinding media
- Two 3' x 3' Steel Mills
- One 3½' x 4' Steel Mill
- One 4' x 5' Steel Mill
- Seven 5' x 6' Steel Mills
- One 8' x 10' Steel Mill

Attrition Mills (Union Process Q-50)

- Recirculating batch attrition
- Used for fine grinding
- Chrome Steel spherical grinding media
- Load capacity of 1,000 ~ 3,000 Kg (2,000 ~ 7,000 lbs) solids
- 2,000 liter (500 gallon) Holding Tank for continuous attrition
- 2 Attritors are available

Dry Grinding Mill (Palla Rod Mill)

- Particle size reduction capability down to 1 micron
- ~ 1,000 Kg/hr (~ 2,000 lbs/hr) throughput

Hammer Mill (Prater Mill)

- De-agglomeration
- ~ 500 Kg/hr (~ 1,000 lbs/hr) throughput

Hammer Mill (Jacobson Mill)

- De-agglomeration to finer particles used after Prater milling
- ~ 500 Kg/hr (~ 1,000 lbs/hr) throughput

Vibratory Mills (Sweco Vibratory Mills)

- Cylindrical shaped steel grinding media
- ~ 250 Kg (~ 550 lbs) load capacity

Mixing/Pelletizing:

Eirich R-15 Mixer/Pelletizer

- Pellet size of 5 ~ 10 mm
- 550 Kg/hr (1,200 lbs/hr) throughput
- Calcination option of pellets/powder through Indirect Calciner
- Packaging capabilities to barrels or bulk bags

Eirich R-12 Mixer/Pelletizer

- Pellet size of 5 ~ 10 mm
- 270 Kg/hr (600 lbs/hr) throughput
- Calcination option of pellets/powder through Indirect Calciner
- Packaging capabilities to barrels or bulk bags

Wet Mixer #1

- Slurry mixing of powders and liquids via Cowles or RotoSolver Shear Mixer
- 1,000 Kg/hr (2,200 lbs/hr) solids throughput
- Currently used to feed Spray Dryer
- Wet calcination option of slurry through Direct Gas Fired Calciner

Wet Mixer #2

- Slurry mixing of powders and liquids via Cowles or RotoSolver Shear Mixer
- 1,000 Kg/hr (2,200 lbs/hr) solids throughput
- Currently used to feed Spray Dryer

Intensive Mixer - Henschel Mixer, 250 liter (60 gallons) capacity

Powder Classification Equipment:

48" Sweco Screeners (single and double deck)

- 150 ~ 700 Kg/hr (300 ~ 1,500 lbs/hr) throughput
- 4 US Mesh through 325 US Mesh screening capability

30" Sweco Screeners (single deck)

- 50 ~ 700 Kg/hr (100 ~ 1,500 lbs/hr) throughput
- 4 US Mesh through 325 US Mesh screening capability

Magnetic Separator

- Magnetic separation of powders or slurry
- ~ 450 Kg/hr (~ 1,000 lbs/hr) throughput

Dry Blending Equipment:

Double Cone Blender

- 4.4 m³ (155 ft³) load capacity
- 1 MT (2,200 lbs) super sacks packaging capability
- 2 units are available

V-Blender

- 1.4 m³ (50 ft³) load capacity

Nauta Blender

- 3.2 m³ (113 ft³) load capacity

Nauta Blender

- 1.4 m³ (50 ft³) load capacity

Ribbon Blender

- 3.6 m³ (127 ft³) load capacity

Alternative Drying Equipment:

Pan Drying Ovens

- Various sized Blue M Ovens

Innovative Materials Center Equipment:

Batching and Blending Equipment

- Mixer / Pelletizer (Eirich R-7); 50 Kg load capacity
- Intensive Mixer (Papenmeier); 5 Kg load capacity
- Intensive Mixer (Henschel); 250 liter (60 gallons) capacity
- V-Blender; Ribbon Blender; Drum Blender; Double Cone Blender
- Shear Mixer; Cowels Mixer and Rotosolver

Calcining and Sintering Equipment

- Electric Fired Rotary Calciner (Bartlett-Snow) capable to 1110°C
 - Inconel 601 tube of 20 cm Ø x 2.7 m (L)
 - 3 ~ 6 Kg/hr throughput
- Electric Fired Rotary Calciner (Riedhammer) capable to 1110°C
 - Inconel 601 tube of 36 cm Ø x 8 m (L) with 4.5 m heat zone
 - 30 ~ 70 Kg/hr throughput
- Electric Elevator Kilns (Harper) capable to 1370°C
 - Nitrogen atmosphere capability; 2 units are available
 - Maximum loading 48 of 3.5 liter capacity saggars
- Electric Shuttle Kiln (Nabertherm) capable to 1340°C
 - 38" (W) x 144" (L) x 56" (H) working dimension
 - Maximum loading 546 of 3.5 liter capacity saggars
- Temperature Gradient Furnaces; 2 units are available

Grinding Equipment

- Batch Attritor (Union Process S-1) with YTZ balls; 1.5 gallon capacity
- Recirculating Attritor (Union Process Q-6) with YTZ balls connected with a 300 liter (80 gallons) Slurry Holding Tank
- Jar Mills with Roller
- Steel Ball Mill (2' x 2½') with Hardened C-Steel grinding media
- Steel Ball Mill (3' x 3') with Hardened C-Steel grinding media
- Ceramic Ball Mill (1,000 liter) with high Alumina grinding media
- Dry Mills - Hammer Mill; Prater Mill; Sweco Vibratory Mill

Spray Drying Equipment

- Bowen Nozzle Tower™ Dryer; ~ 5 Kg/hr throughput
- 9'6" Anhydro Spray Dryer – Nozzle Dryer 80-150 microns Dv50

Complement Equipment

- Blue M Ovens
- De-lumper for breaking up agglomerates
- 24", 30", and 42" Sweco multiple deck Screeners
- Magnetic Separator